Influence of Drop Height on the Impact Characteristics of Futsal Ball Size Four

Influence of Drop Height on the Impact Characteristics of Futsal Ball Size Four

S T Syed Shazali[1], F H P Alban Dattu[2], A M Aizuddin[1], M Andrew-Munot[1] and N H Noor Mohamed[1]

[1] Faculty of Engineering, Universiti Malaysia Sarawak, Jalan Datuk Mohammad Musa, 94300 Kota Samarahan, Sarawak, Malaysia
[2] School of Science and Technology, International College of Advanced Technology Sarawak, Jalan Stampin Timur, 93350, Kuching Sarawak, Malaysia
Corresponding author: starmizi@unimas.my

Abstract. Futsal research on the ball characteristic has received little scientific attention. Recently modern football has been developed that afford excellent ball control and delivering. Difference constructions and sizes of ball deliver different characteristics of the ball. The purpose of this study is to examine Futsal ball size four deformations and coefficient of restitution (COR) during the impact. In this study, the Futsal ball was dropped vertically under three conditions. A subject performed five repetitive drops off the ball to impact a steel plate. The ball velocity was measured by SparkVue motion sensor attached on the top of the apparatus while the deformation was recorded using a high-speed video camera, that can up to 1,000 frames per second. From the experiment, the ball deformation and COR were measured. The results obtained showed the deformation and COR value vary with different heights for the same type of Futsal ball size four. It shows that the different heights of ball drops give different ball impact characteristics. It was found that the COR depended on the amount of the deformation of the ball.

1. Introduction

In many sports, ball properties are held to strict standards to maintain a high level of consistency and performance. The ball itself is a critical component in specific sports such as football, hockey, tennis, and volleyball where those games have to meet strict requirements of game safety. To achieve better performance and quality, the sports ball design and manufacturing required a test, such as an impact test to ensure that the sports ball meets the safety requirements. The deformation of the ball itself plays an essential role in the performance of the ball. The design and development of sports balls are significant activities to gain competitive advantages within the market. Regardless of the market interest, the researchers aim to improve sports performance and to reduce injuries [1].

A head injury in football accounted as the highest number of injuries compared to neck injuries. The football-related head injuries may occur in at least four ways; head contact with the ball (heading), contact with another player, contact with the ground and contact with a stationary object. Head risks of football player injuries are increased in goalkeepers. The goalkeeper is the position that has the most risk of the casualties among the players. The goalkeeper needs to be ready with the oncoming balls, which in the position most at risk for head injury. They are also exposed to the impact of the ball at the fastball kicked by another player [2]. During the actual games, the footballer can kick